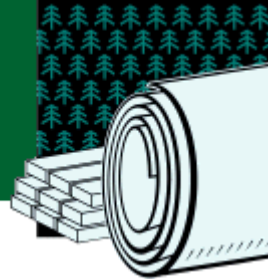


FOREST PRODUCTS

Project Fact Sheet



STABILITY AND REGENERABILITY OF CATALYSTS FOR THE DESTRUCTION OF TARS FROM BIOMASS AND BLACK LIQUOR GASIFICATION

BENEFITS

- Allows the production of an acceptable quality of green liquor from black liquor gasification
- Increases thermal efficiency in both gasification processes
- Reduces emissions of volatile organic compounds
- Overcomes a barrier to market acceptance of black liquor and biomass gasification systems
- Increases energy efficiency
- Reduces capital investment by keeping unit costs down
- Eliminates the specific danger of smelt/water explosions associated with the kraft recovery process

APPLICATIONS

Selection of stable and regenerable catalysts will reduce or eliminate tars created during biomass and black liquor gasification, enabling more successful commercialization of these systems.

Researchers Seek Catalysts with Longer Lives and Regeneration Capabilities for Gasification-Induced Tar Destruction

Although black liquor and biomass gasification processes promise a cost-effective alternative to traditional kraft recovery boilers, tar formation is inhibiting their commercialization. Tar build-up reduces the amount of combustible material in the gasifier, poses a potential safety hazard, and clogs up or shuts down the gasifier and its downstream processes.

The most efficient method of eliminating tars is called catalytic cracking, a process that breaks down tars into lighter gases. Previous research has indicated that certain catalysts have potential for biomass and coal tar destruction. However, a number of components found in black liquor and biomass fuel gas are suspected to provoke rapid catalyst deactivation, which causes the catalyst to lose its ability to break down tars.

Investigators will study how various factors (e.g., temperature, gas concentrations) affect deactivation rates on promising catalysts. An understanding of deactivation causes will enable researchers to develop and test effective regeneration schemes. The product of this scheme will be catalysts with extended lifetimes that can break down tars on a sustained, economically feasible basis.



OFFICE OF INDUSTRIAL TECHNOLOGIES

ENERGY EFFICIENCY AND RENEWABLE ENERGY • U.S. DEPARTMENT OF ENERGY

PROJECT DESCRIPTION

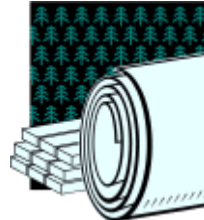
Goal: To develop catalysts with an extended life for tar destruction processes and create an economical means for the regeneration of aged/deactivated catalysts.

This two year project will use a bench scale reactor, a pilot scale reactor, and characterization techniques to carry out four tasks, outlined below:

- 1. Bench Reactor Studies** will examine the activity of three catalysts, their deactivation rates, and the how they react with alkali metals.
- 2. Pilot Reactor Studies** are intended to quantify the tar destruction activity and catalyst stability for gas phase compositions and tar compounds typical of commercial operations.
- 3. Aged Catalyst Characterization** will lend insight into catalyst regeneration schemes and modifications necessary to the primary catalytic material.
- 4. Catalyst Regeneration Studies** will test and identify catalyst regeneration schemes on bench scale and pilot scale reactors.

PROGRESS & MILESTONES

- Unpublished research results from a similar DOE/OIT project, "Characterization and Conditioning of Tars Produced During Black Liquor Gasification," revealed that both cobalt and nickel based catalysts are active for black liquor tar destruction.
- Bench scale reactor studies are in progress and scheduled for completion in June 2001.
- Commercially available Group VIII transition metal catalysts have been tested for their activity in catalyzing the reaction between benzene and steam at temperatures between 500° C and 700° C.



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